BLG 3/INF….
May 1, 1998

SUB-COMMITTEE ON BULK LIQUIDS
AND GASES
3rd session
Agenda item 5

REVISION OF MARPOL REGULATIONS I/22-24 IN THE LIGHT OF THE PROBABILISTIC METHODOLOGY FOR OIL OUTFLOW ANALYSIS

Oil Outflow Analysis for a Series of Double Hull Tankers

Submitted by the United States

SUMMARY

Executive summary: This paper submits information on the oil outflow characteristics of series of double hull tankers.

Action to be taken: Information only.

Related documents: BLG 3/5 (Report of the Working Group at BLG 2 (Part 2)), BLG 3/5/1 (Report of the Correspondence Group), BLG 3/5/… (A Proposed Cargo Tank Size and Arrangement Parameter, Submitted by the United States)

1 The BLG Sub-Committee is revising regulations I/22-24 of MARPOL 73/78. In this regard, at the 2nd session of the Sub-Committee, a Working Group was established that developed a draft regulation to replace regulations I/22-24. Regulations 22-24 were primarily intended as a means of establishing the cargo tank size and arrangements on single hull tankers. This draft regulation is contained at Annex I to BLG 3/5 (Report of the Working Group at BLG 2 (Part 2)), and includes a methodology for using the oil outflow from accidental collisions and groundings as a performance basis to set the internal tankage configuration for new double hull tankers.

2 The United States is pleased to present the results of a study, contained at annex, of oil outflow from a series of double hull tankers. These calculations were performed using the methodology in the draft regulation noted above. The study presents the mean outflow for the series of double hull tankers studied, and also discusses some design characteristics of recent double hull tankers.

3 The United States invites the Sub-Committee to consider the information in the study contained at annex.

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Annex

OIL OUTFLOW ANALYSIS

for a

SERIES OF DOUBLE HULL TANKERS

March 31, 1998
Revised April 30, 1998

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Report No. 9749-1 Rev. A

Overview

The BLG (Bulk Liquids and Gases) Sub-Committee is currently developing an accidental oil outflow regulation [1, 2] that will replace current hypothetical outflow and tank size requirements contained in MARPOL Regulation I/22-24. The calculation methodology for this *"Accidental Oil Outflow"* regulation is substantially complete. The draft regulation is performance-based, and the next step in the regulatory development process is to establish the standard or level of performance that will be expected from future tankers. In this study the proposed calculation methodology is applied to a series of double hull tanker designs, which cover a broad range of sizes, cargo tank arrangements, and wing tank and double bottom dimensions.

Designs Evaluated

A matrix representing the 96 designs evaluated in this study is presented in Table 1. Within each size range, the cargo tank configurations were evaluated with each of the three assumed double hull dimensions. The four reference designs from the *IMO Guidelines* for evaluating alternatives to double hull tankers [3] are highlighted with bold text.

	Cargo Deadweight at 98% Filling (MT)								
	5,000	40,000	**60,000**	100,000	**150,000**	220,000	**283,000**	350,000	450,000
Wing Tk. Width x D.B. Height (m x m)	**1.0 x 1.1** 1.25 x 1.25 1.5 x 1.5	2.0 x 2.0 2.25 x 2.25 2.5 x 2.5	**2.0 x 2.0** 2.25 x 2.25 2.5 x 2.5	2.0 x 2.0 2.5 x 2.5 3.0 x 3.0	**2.0 x 2.32** 2.5 x 2.5 3.0 x 3.0	2.5 x 2.5 3.0 x 3.0 3.5 x 3.5	**4.0 x 2.0** 3.0 x 3.0 3.5 x 3.5	3.0 x 3.0 3.5 x 3.5 4.0 x 4.0	3.0 x 3.0 3.5 x 3.5 4.0 x 4.0
Cargo Tank Arrangement (Long'l x Transverse)	5 x 2 **6 x 2** 7 x 2	5 x 2 6 x 2 7 x 2	5 x 2 **6 x 2** 7 x 2	5 x 2 6 x 2 7 x 2	5 x 2 **6 x 2** 7 x 2 5 x 3	6 x 2 7 x 2 5 x 3 6 x 3	**5 x 3** 6 x 3 5 x 4 5 x 5	5 x 3 6 x 3 5 x 4 5 x 5	5 x 3 6 x 3 5 x 4 5 x 5
No. of Designs	9	9	9	9	12	12	12	12	12

Table 1
Matrix of Ship Sizes and Configurations

The total cargo oil capacity is identical for all designs of a given size. For each design, all cargo tanks are of equal length. In addition to the cargo tanks, a pair of slop tanks are provided with a combined capacity equal to about 2.0% to 2.5% of the total cargo capacity.

A typical 6x2 (6 tanks long by two tanks wide) cargo tank arrangement is shown in Figure 1. For all designs, “L” type ballast tanks are used, with the fore and aft ballast tank boundaries aligning with the cargo tank transverse bulkheads. The aft-most ballast tank P/S extends longitudinally below the slop tank and the adjacent cargo tank.

The assumed spacing of longitudinal bulkheads is shown in Figure 2.

A baseline design was selected for each ship size (see Table 2). Design characteristics such as the hull lines, the tapering of the longitudinal bulkheads fore and aft, and the locations of the collision and engine room bulkheads are consistent with modern practice.

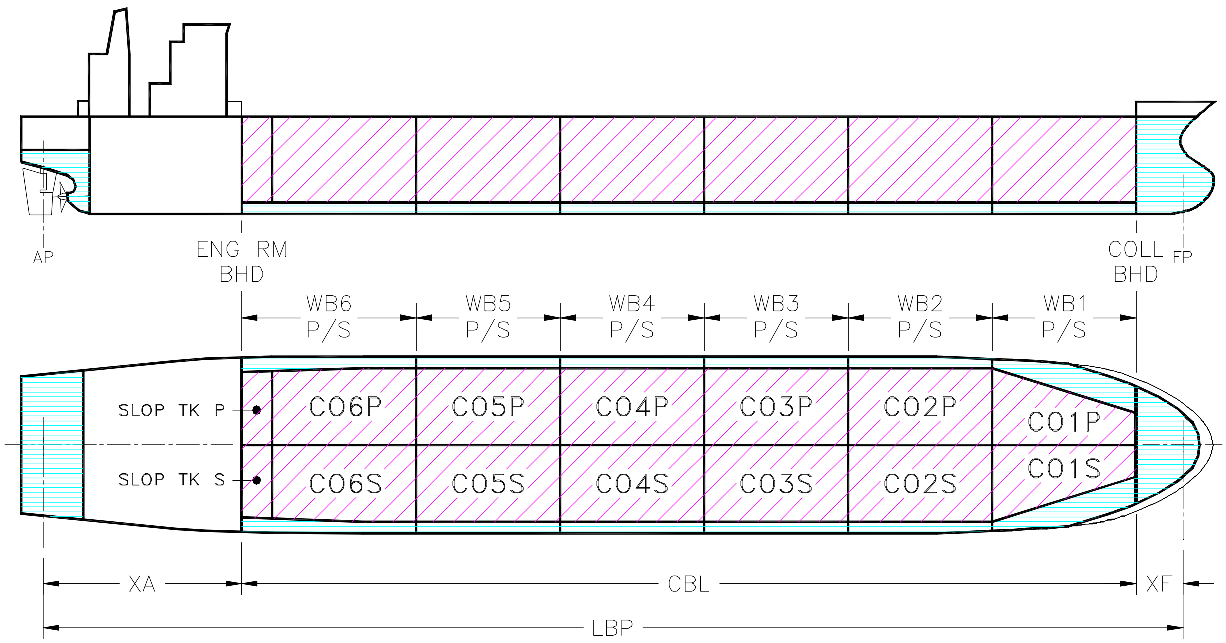

Figure 1
Typical 6x2 Cargo Tank Arrangement

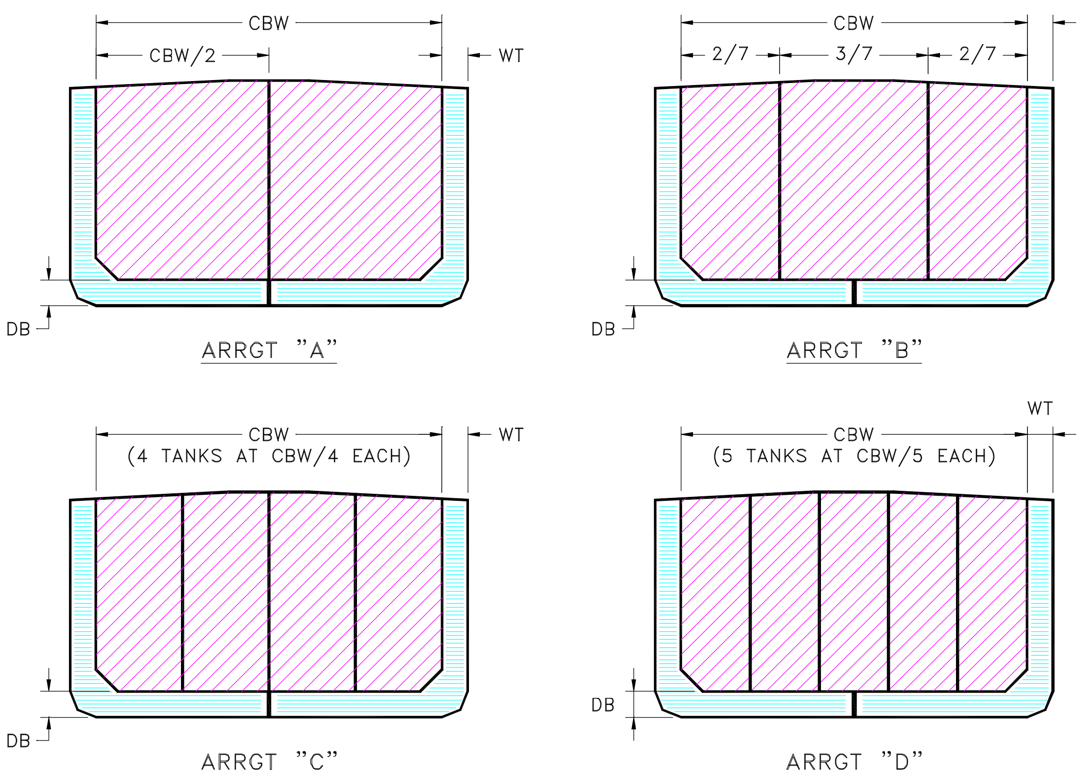

Figure 2
Midship Sections

A nominal cargo oil density of 0.855 t/m^3 is assumed for all designs. The assumed summer load line draft for each baseline design corresponds to a condition with cargo tanks and slop tanks loaded to 98% capacity plus 50% consumables.

Cargo Deadweight (MT)		**5,000**	40,000	**60,000**	95,000	**150,000**	220,000	**283,000**	350,000	450,000
Cargo Tank Arrg't		6x2	6x2	6x2	6x2	6x2	6x2	5X3	5X3	5X3
Wing Tank Width	(m)	1.00	2.00	2.00	2.00	2.00	2.50	4.00	3.50	3.50
Double Bottom Ht	(m)	1.10	2.00	2.00	2.00	2.32	2.50	2.00	3.50	3.50
LBP	(m)	95.00	170.25	203.50	235.20	264.00	295.50	318.00	342.00	365.00
Beam (molded)	(m)	16.50	30.96	36.00	41.80	48.00	53.50	57.00	63.00	68.00
Depth (molded)	(m)	8.30	17.03	18.00	19.80	24.00	27.50	31.00	32.50	35.00
Full Draft (molded)	(m)	6.20	11.72	12.20	13.79	16.80	19.66	22.00	23.00	25.50
98% Cargo Capacit	(m^3)	5,848	46,784	70,175	111,111	175,439	257,310	330,994	409,357	526,316
Cargo Oil Density	(MT/m^3)	0.855	0.855	0.855	0.855	0.855	0.855	0.855	0.855	0.855

Table 2
Baseline Design Particulars

The other designs in a given size are extrapolated from the baseline design. The cargo block outer boundaries are assumed constant, and therefore the cargo volume remains unchanged. The beam and depth is reduced or increased as required to accommodate changes in double hull dimensions. The LBP is held constant. The block coefficient is adjusted to maintain constant draft.

The outer longitudinal bulkheads are sloped inboard fore and aft, in order to maintain the designated clearances. Typically, the nominal wing tank clearance is maintained in way of the parallel midbody and at the ends of the cargo block. Due to the shape of the hull in contrast to the flat plane of the bulkhead, the clearances typically exceed the nominal clearance towards the centers of the fore and aft cargo tanks (see Figure 1).

The increased wing tank clearances tend to improve environmental performance (i.e. reduce mean outflow and increase the probability of zero outflow). Because these increased clearances are somewhat arbitrary and subject to a yard's practice, outflow calculations in this study assume the nominal double bottom and wing tank clearances are exactly maintained throughout the cargo block. When calculating the probabilities of breaching the cargo tanks, a simplified prismatic hull shape was assumed (see Figure 3).

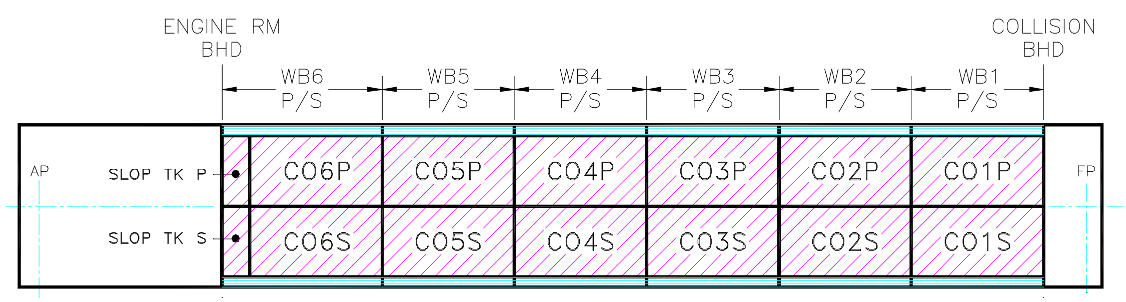

Figure 3
Prismatic Hull Form
(Assumed for Probability Calculations)

Oil Outflow Analysis

Table 3 shows a comparison of the probability of zero outflow and mean outflow parameters obtained in this analysis and those published in the *IMO Guidelines* for evaluating alternatives to double hull tankers [3].

	Cargo DWT (MTons)	Cargo Tank Arrg't	WT x DB (m)	Mean Outflow Parameter O_M / C	Probability of Zero Outflow P_0
As Calculated	5,000	6x2	1.0 x 1.1	0.014	0.84
Per IMO Guidelines				0.017	0.81
As Calculated	60,000	6x2	2.0 x 2.0	0.016	0.81
Per IMO Guidelines				0.014	0.81
As Calculated	150,000	6x2	2.0 x 2.32	0.018	0.77
Per IMO Guidelines				0.016	0.79
As Calculated	283,000	5x3	4.0 x 2.0	0.012	0.75
Per IMO Guidelines				0.013	0.77

Table 3
Outflow Parameter Comparison (with IMO Reference Ships)

Factors contributing to the differences in results are:

- The draft *"Accidental Outflow Regulation"* contains certain simplifying assumptions. These include the treatment of how the capture of oil by the double bottom tanks is accounted for, and also how the pdf's are applied.

- The calculations in this study assume uniform wing tank and double bottom dimensions over the full extent of the cargo block, and prismatic cross-sections for the tanks.

With regard to the differences in results for the specific designs:

5,000 DWT: The *IMO Guideline* calculations assume the damage is in the form of a vertical, rectangular block. This design has significant flare in the outer longitudinal bulkhead forward, in order to maximize cargo volume. The rectangular damage strikes the upper edge of the forward cargo tanks, resulting in a relative high probability of damage. In contrast, the draft *"Accidental Outflow Regulation"* measures all damage horizontally from the shell. This approach yields higher P_0 and lower mean outflow parameters.

60,000 DWT and 150,000 DWT: In this study, a uniform wing tank width is assumed over the length of the cargo block. In the designs analyzed for the development of the *IMO Guidelines*, the wing tank width towards the middle of the fwd cargo tanks exceeds the nominal wing tank dimension. This tends to reduce the probability of breaching these tanks in collisions, and accounts for the lower mean outflow parameters obtained in the *IMO Guideline* calculations.

283,000 DWT: Similarly, the uniform wing tank width results in a reduction in the probability of zero outflow parameter. The mean outflow parameter is in close agreement.

The oil outflow results are summarized in Tables 4 and 5.

Cargo DWT (MTons)	Cargo Tank Arrg't	WT x DB (m)	Mean Ouflow (m^3) Side O_{MS}	Bottom O_{MB}	Total O_M	98% Cap. (m^3) C	Mean Outflow Parameter O_M / C
5,000	5x2	1.0 x 1.1	115	68	87	5,849	0.0148
		1.25 x 1.25	89	61	72	5,849	0.0124
		1.5 x 1.5	73	52	60	5,849	0.0103
	6x2	1.0 x 1.1	102	64	79	5,849	0.0136
		1.25 x 1.25	79	57	66	5,849	0.0113
		1.5 x 1.5	65	49	55	5,849	0.0094
	7x2	1.0 x 1.1	93	61	74	5,849	0.0126
		1.25 x 1.25	72	55	62	5,849	0.0106
		1.5 x 1.5	59	46	51	5,849	0.0088
40,000	5x2	2.0 x 2.0	898	526	675	46,784	0.0144
		2.25 x 2.25	785	493	609	46,784	0.0130
		2.5 x 2.5	694	460	554	46,784	0.0118
	6x2	2.0 x 2.0	797	491	613	46,784	0.0131
		2.25 x 2.25	696	460	555	46,784	0.0119
		2.5 x 2.5	616	430	504	46,784	0.0108
	7x2	2.0 x 2.0	724	468	570	46,784	0.0122
		2.25 x 2.25	633	438	516	46,784	0.0110
		2.5 x 2.5	560	409	470	46,784	0.0100
60,000	5x2	2.0 x 2.0	1,680	894	1,208	70,175	0.0172
		2.25 x 2.25	1,490	840	1,100	70,175	0.0157
		2.5 x 2.5	1,327	788	1,003	70,175	0.0143
	6x2	2.0 x 2.0	1,492	833	1,096	70,175	0.0156
		2.25 x 2.25	1,323	783	999	70,175	0.0142
		2.5 x 2.5	1,178	734	911	70,175	0.0130
	7x2	2.0 x 2.0	1,357	793	1,019	70,175	0.0145
		2.25 x 2.25	1,204	745	929	70,175	0.0132
		2.5 x 2.5	1,072	699	848	70,175	0.0121
95,000	5x2	2.0 x 2.0	3,115	1,367	2,066	111,111	0.0186
		2.5 x 2.5	2,791	1,305	1,899	111,111	0.0171
		3.0 x 3.0	2,512	1,242	1,750	111,111	0.0157
	6x2	2.0 x 2.0	2,758	1,275	1,869	111,111	0.0168
		2.5 x 2.5	2,471	1,218	1,719	111,111	0.0155
		3.0 x 3.0	2,224	1,159	1,585	111,111	0.0143
	7x2	2.0 x 2.0	2,503	1,211	1,728	111,111	0.0156
		2.5 x 2.5	2,242	1,157	1,591	111,111	0.0143
		3.0 x 3.0	2,018	1,101	1,468	111,111	0.0132
150,000	5x2	2.0 x 2.32	5,661	1,950	3,434	175,439	0.0196
		2.5 x 2.5	4,540	1,835	2,917	175,439	0.0166
		3.0 x 3.0	3,788	1,691	2,530	175,439	0.0144
	6x2	2.0 x 2.32	5,018	1,819	3,099	175,439	0.0177
		2.5 x 2.5	4,025	1,712	2,637	175,439	0.0150
		3.0 x 3.0	3,358	1,578	2,290	175,439	0.0131
	7x2	2.0 x 2.32	4,558	1,730	2,861	175,439	0.0163
		2.5 x 2.5	3,656	1,628	2,439	175,439	0.0139
		3.0 x 3.0	3,050	1,500	2,120	175,439	0.0121
	5x3	2.0 x 2.32	3,267	1,834	2,407	175,439	0.0137
		2.5 x 2.5	2,620	1,761	2,105	175,439	0.0120
		3.0 x 3.0	2,186	1,663	1,872	175,439	0.0107

Table 4
Outflow Summary (5,000 CDWT – 150,000 CDWT)

Cargo DWT (MTons)	Cargo Tank Arrg't	WT x DB (m)	Mean Ouflow (m^3) Side O_{MS}	Bottom O_{MB}	Total O_M	98% Cap. (m^3) C	Mean Outflow Parameter O_M / C
220,000	6x2	2.5 x 2.5	6,549	2,358	4,034	257,310	0.0157
		3.0 x 3.0	5,509	2,160	3,500	257,310	0.0136
		3.5 x 3.5	4,687	2,016	3,084	257,310	0.0120
	7x2	2.5 x 2.5	5,943	2,237	3,719	257,310	0.0145
		3.0 x 3.0	5,000	2,049	3,229	257,310	0.0125
		3.5 x 3.5	4,254	1,911	2,848	257,310	0.0111
	5x3	2.5 x 2.5	4,254	2,151	2,992	257,310	0.0116
		3.0 x 3.0	3,578	1,984	2,622	257,310	0.0102
		3.5 x 3.5	3,044	1,864	2,336	257,310	0.0091
	6x3	2.5 x 2.5	3,769	2,012	2,715	257,310	0.0106
		3.0 x 3.0	3,171	1,855	2,381	257,310	0.0093
		3.5 x 3.5	2,698	1,742	2,124	257,310	0.0083
283,000	5x3	4.0 x 2.0	3,433	4,175	3,878	330,994	0.0117
		3.0 x 3.0	4,671	3,395	3,905	330,994	0.0118
		3.5 x 3.5	3,980	3,226	3,527	330,994	0.0107
	6x3	4.0 x 2.0	3,041	3,894	3,553	330,994	0.0107
		3.0 x 3.0	4,138	3,166	3,555	330,994	0.0107
		3.5 x 3.5	3,526	3,009	3,216	330,994	0.0097
	5x4	4.0 x 2.0	3,157	3,056	3,097	330,994	0.0094
		3.0 x 3.0	4,320	2,550	3,258	330,994	0.0098
		3.5 x 3.5	3,674	2,381	2,898	330,994	0.0088
	5x5	4.0 x 2.0	3,129	3,577	3,398	330,994	0.0103
		3.0 x 3.0	4,056	3,113	3,490	330,994	0.0105
		3.5 x 3.5	3,541	3,033	3,236	330,994	0.0098
350,000	5x3	3.0 x 3.0	6,600	3,481	4,729	409,357	0.0116
		3.5 x 3.5	5,706	3,340	4,286	409,357	0.0105
		4.0 x 4.0	4,960	3,226	3,920	409,357	0.0096
	6x3	3.0 x 3.0	5,843	3,246	4,284	409,357	0.0105
		3.5 x 3.5	5,051	3,114	3,889	409,357	0.0095
		4.0 x 4.0	4,392	3,007	3,561	409,357	0.0087
	5x4	3.0 x 3.0	6,104	2,544	3,968	409,357	0.0097
		3.5 x 3.5	5,275	2,394	3,546	409,357	0.0087
		4.0 x 4.0	4,579	2,269	3,193	409,357	0.0078
	5x5	3.0 x 3.0	5,624	3,103	4,112	409,357	0.0100
		3.5 x 3.5	4,964	3,045	3,813	409,357	0.0093
		4.0 x 4.0	4,409	3,005	3,567	409,357	0.0087
450,000	5x3	3.0 x 3.0	9,293	4,376	6,343	526,316	0.0121
		3.5 x 3.5	8,012	4,053	5,636	526,316	0.0107
		4.0 x 4.0	7,027	3,944	5,177	526,316	0.0098
	6x3	3.0 x 3.0	8,225	4,078	5,737	526,316	0.0109
		3.5 x 3.5	7,091	3,777	5,102	526,316	0.0097
		4.0 x 4.0	6,219	3,676	4,693	526,316	0.0089
	5x4	3.0 x 3.0	8,587	3,182	5,344	526,316	0.0102
		3.5 x 3.5	7,410	2,886	4,696	526,316	0.0089
		4.0 x 4.0	6,495	2,755	4,251	526,316	0.0081
	5x5	3.0 x 3.0	7,824	3,811	5,416	526,316	0.0103
		3.5 x 3.5	6,888	3,633	4,935	526,316	0.0094
		4.0 x 4.0	6,159	3,602	4,624	526,316	0.0088

Table 5
Outflow Summary (220,000 CDWT – 450,000 CDWT)

Proposed Standard

The mean outflow parameters are displayed as a function of the cargo capacity in Figure 4. The dashed line represents a proposed standard for mean outflow. In Table 6, designs are sorted by mean outflow parameter. The IMO reference ships are identified with double lines.

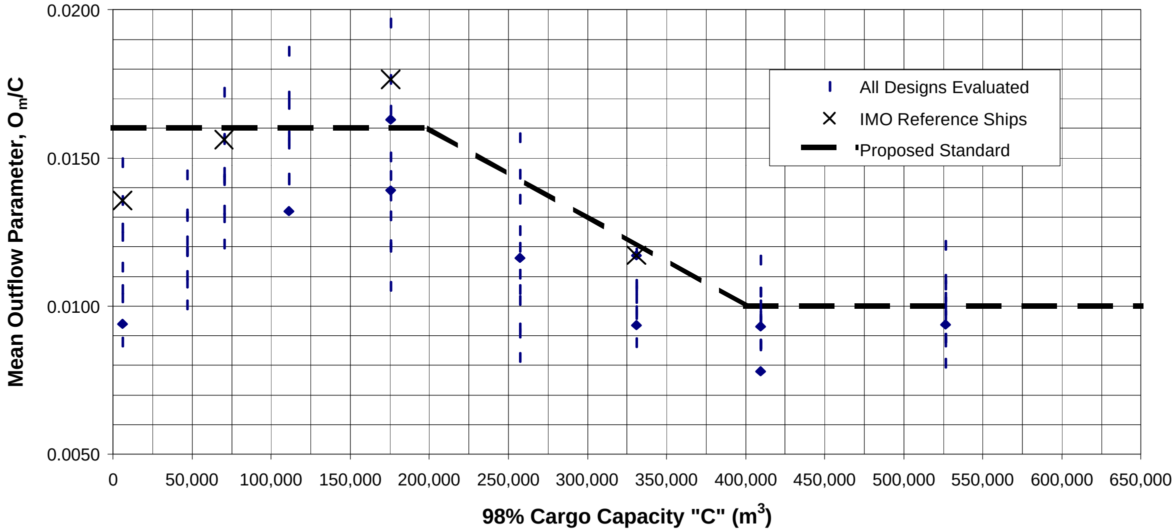

Figure 4
Mean Outflow Parameters

98% CARGO CAPACITY

5,000 MT 5,849 m^3	40,000 MT 46,784 m^3	60,000 MT 70,175 m^3	95,000 MT 111,111 m^3	150,000 MT 175,439 m^3	220,000 MT 257,310 m^3	283,000 MT 330,994 m^3	350,000 MT 409,357 m^3	450,000 MT 526,316 m^3
Standard 0.0160	**Standard 0.0160**	5x2 2.0x2.0 0.0172	5x2 2.0x2.0 0.0186	5x2 2.0x2.32 0.0196	6x2 2.5x2.5 0.0157	**Standard 0.0121**	5x3 3.0x3.0 0.0116	5x3 3.0x3.0 0.0121
5x2 1.0x1.1 0.0148	5x2 2.0x2.0 0.0144	**Standard 0.0160**	5x2 2.5x2.5 0.0171	6x2 2.0x2.32 0.0177	7x2 2.5x2.5 0.0145	5x3 3.0x3.0 0.0118	5x3 3.5x3.5 0.0105	6x3 3.0x3.0 0.0109
6x2 1.0x1.1 0.0136	6x2 2.0x2.0 0.0131	5x2 2.25x2.25 0.0157	6x2 2.0x2.0 0.0168	5x2 2.5x2.5 0.0166	**Standard 0.0143**	5x3 4.0x2.0 0.0117	6x3 3.0x3.0 0.0105	5x3 3.5x3.5 0.0107
7x2 1.0x1.1 0.0126	5x2 2.25x2.25 0.0130	6x2 2.0x2.0 0.0156	**Standard 0.0160**	7x2 2.0x2.32 0.0163	6x2 3.0x3.0 0.0136	5x3 3.5x3.5 0.0107	**Standard 0.0100**	5x5 3.0x3.0 0.0103
5x2 1.25x1.25 0.0124	7x2 2.0x2.0 0.0122	7x2 2.0x2.0 0.0145	5x2 3.0x3.0 0.0157	**Standard 0.0160**	7x2 3.0x3.0 0.0125	6x3 4.0x2.0 0.0107	5x5 3.0x3.0 0.0100	5x4 3.0x3.0 0.0102
6x2 1.25x1.25 0.0113	6x2 2.25x2.25 0.0119	5x2 2.5x2.5 0.0143	7x2 2.0x2.0 0.0156	6x2 2.5x2.5 0.0150	6x2 3.5x3.5 0.0120	6x3 3.0x3.0 0.0107	5x4 3.0x3.0 0.0097	**Standard 0.0100**
7x2 1.25x1.25 0.0106	5x2 2.5x2.5 0.0118	6x2 2.25x2.25 0.0142	6x2 2.5x2.5 0.0155	5x2 3.0x3.0 0.0144	5x3 2.5x2.5 0.0116	5x5 3.0x3.0 0.0105	5x3 4.0x4.0 0.0096	5x3 4.0x4.0 0.0098
5x2 1.5x1.5 0.0103	7x2 2.25x2.25 0.0110	7x2 2.25x2.25 0.0132	6x2 3.0x3.0 0.0143	7x2 2.5x2.5 0.0139	7x2 3.5x3.5 0.0111	5x5 4.0x2.0 0.0103	6x3 3.5x3.5 0.0095	6x3 3.5x3.5 0.0097
6x2 1.5x1.5 0.0094	6x2 2.5x2.5 0.0108	6x2 2.5x2.5 0.0130	7x2 2.5x2.5 0.0143	5x3 2.0x2.32 0.0137	6x3 2.5x2.5 0.0106	5x4 3.0x3.0 0.0098	5x5 3.5x3.5 0.0093	5x5 3.5x3.5 0.0094
7x2 1.5x1.5 0.0088	7x2 2.5x2.5 0.0100	7x2 2.5x2.5 0.0121	7x2 3.0x3.0 0.0132	6x2 3.0x3.0 0.0131	5x3 3.0x3.0 0.0102	5x5 3.5x3.5 0.0098	6x3 4.0x4.0 0.0087	6x3 4.0x4.0 0.0089
				7x2 3.0x3.0 0.0121	6x3 3.0x3.0 0.0093	6x3 3.5x3.5 0.0097	5x4 3.5x3.5 0.0087	5x4 3.5x3.5 0.0089
				5x3 2.5x2.5 0.0120	5x3 3.5x3.5 0.0091	5x4 4.0x2.0 0.0094	5x5 4.0x4.0 0.0087	5x5 4.0x4.0 0.0088
				5x3 3.0x3.0 0.0107	6x3 3.5x3.5 0.0083	5x4 3.5x3.5 0.0088	5x4 4.0x4.0 0.0078	5x4 4.0x4.0 0.0081

Table 6
Mean Outflow Parameters

All IMO reference ships fall within the proposed standard except the 150,000 (SUEZMAX) design. The reference ship has a 6x2 tank arrangement with a 2.0 m wing tanks and 2.32 m double bottom. In order to satisfy the proposed standard, and increase in the wing tank and double bottom dimensions to about 2.4 m x 2.4 m is required. As illustrated in Figure 5 and Figure 6, most of the SUEZMAX tankers constructed in recent years have clearances exceeding 2.4 m. This is primarily due to structural and access considerations.

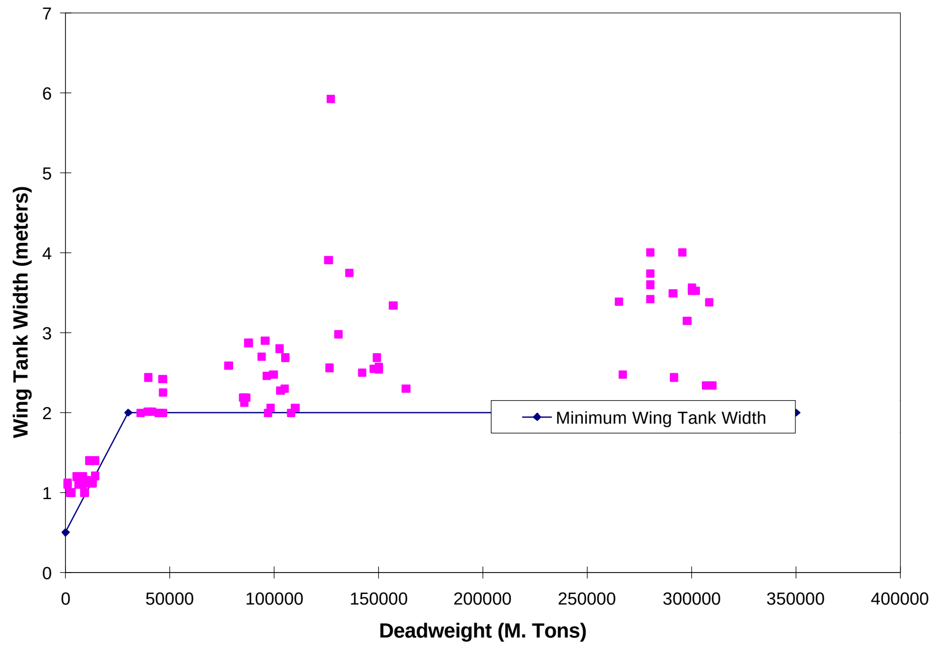

Figure 5
Wing Tank Width (for Recent Double Hull Tankers)

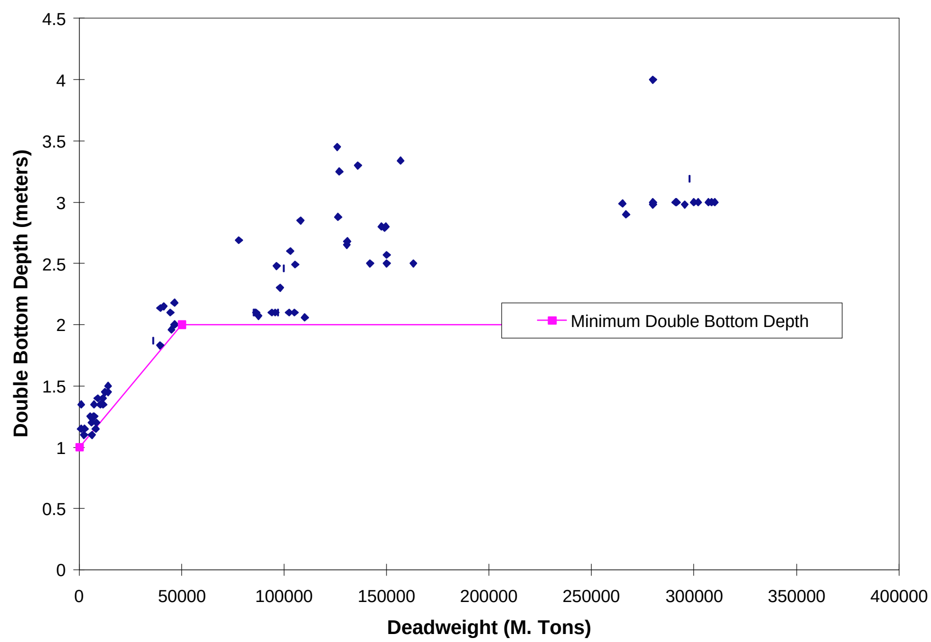

Figure 6
Double Bottom Depth (for Recent Double Hull Tankers)

Anticipated impact of this proposed standard is as follows:

- The standard will likely eliminate future tankers with “single tank across” cargo tanks. For instance, a 40,000 DWT tanker with a 7x1 cargo tank arrangement would require 4.25 m deep wing tanks and double bottoms in order to satisfy this proposed outflow standard. It should be noted that, due to intact stability as well as outflow considerations, few (if any) “single tank across” tankers are under construction today.

- AFRAMAX tankers (about 95,000 DWT) with minimum 2m x 2m double hull dimensions will need a 7x2 or greater cargo tank subdivision. The double hull dimensions must be approximately 2.3 m or perhaps 2.4 m if a 6x2 cargo tank arrangement is used.

- Most SUEZMAX tankers under construction utilize a 6x2 (or greater) cargo tank subdivision, and 2.4 m or greater double hull dimensions. The proposed standard will not influence these designs. It will eliminate the occasional design built to minimum double hull dimensions.

- Most VLCC’s under construction utilize a 5x3 (or greater) cargo tank subdivision, and 3m or greater double hull dimensions. The proposed standard will not influence these designs. It will eliminate the occasional design built with wing tank clearances below about 2.8 m.

Thus, the proposed standard will effectively eliminate “single tank across” arrangements, which have been shown to exhibit poor outflow characteristics. It will also influence double hull dimensions for some AFRAMAX (and larger) designs. However, most tankers under construction today will meet the proposed standard.

References

1. "Draft Regulation on Hypothetical Outflow of Oil", BLG 2/4, 1996.

2. “Report of the working group at BLG 2 (part 2) on Revision of MARPOL Regulations I/22 to 24 in the Light of the Probabilistic Methodology for Oil Outflow Analysis", 1997.

3. “Interim Guidelines for the Approval of Alternative Methods of Design and Construction of Oil Tankers under Regulation 13F(5) of Annex I of MARPOL 73/78”, Resolution MEPC.66(37) adopted September 14, 1995.